Samira Malek

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Education

Sharif University of Technology **Tehran, Iran**
Master of Electrical Engineerings, Communications System *2018-2020*
GPA: 3.61 out of 4 (16.97/20), Ranked as 1st university in Iran based on QS Ranking.

Sharif University of Technology **Tehran, Iran**
Bachelor of Electrical Engineerings, Communications *2013-2018*
GPA: 3.37 out of 4 (16.37/20)

Research Interests

- Machine Learning
- Signal & Image Processing
- Natural Language Processing
- Deep Learning
- Optimization
- Information Theory & Communication

Honors and Awards

- Awarded the College of Engineering Dean's Office scholarship at **Pennsylvania State University**. 2022
- **Ranked 29th**: in the Iran Nation-wide University Entrance Exam Known as Konkoor for M.Sc degree, among +40,000 test-takers. 2018
- **Ranked 40th**: in the Iran Nation-wide University Entrance Exam Known as Konkoor for B.Sc degree, among +250,000 test-takers. 2013
- **Silver Medalist**: of 30th Iran National Mathematical Olympiad. 2012
- Admission to middle school and high school in **National Organization for Development of Exceptional Talents (NODET) (success rate < 0.3%).** 2009

Research Experience

Research Assistant, Applied Research Laboratory (ARL) **Pennsylvania, USA**
Pennsylvania State University *2024*

- Description: In this project, we are developing a system powered by Large Language Models (LLMs) to identify both human-created and AI-generated misinformation related to COVID-19. The system will categorize this misinformation into specific types and provide an explanation for why the information is inaccurate. Finally, the system will generate a corrective response that offers clear guidance or instructions addressing the original post.

M.Sc. Thesis, Using Deep Neural Networks for Decoding Linear Codes **Tehran, Iran**
Sharif University of Technology *2020*

- Description: Decoding is treated as a classification problem in this approach, which is doomed by the curse of high dimensionality of training data. Afterwards, I used the belief propagation algorithm to design neural networks based on factor graphs of codes which helps to solve the high dimensionality problem of data and optimize decoding algorithms. The proposed algorithms both improve the performance in terms of bit error rate and reduce the computational complexity of decoding with respect to previous works.

B.Sc. Thesis, Diagnosis of Eye Diseases by Using Recorded Signals from The Neural Retina **Tehran, Iran**
Sharif University of Technology *2018*

- Description: I explored the physiology of the Neural Retina and investigated how neurons would respond to different stimuli in experiments. I worked on recorded MicroElectroRetinoGram (MERG) signal from mice. Afterwards, I wrote a code that could denoise a recorded signal and distinguish a healthy retina from unhealthy.

Work Experience

Data Scientist, Snowa Company **Tehran, Iran**
Customer Relationship Management (CRM) Department *2022*

- Customers Clustering with unsupervised algorithms such as Kmeans in Python.
- Finding Families among all customers with graph algorithms in SQL.
- Designing Data Warehouse.

Publications

Mohsen Farajijalal, **Samira Malek**, Arash Toudeshki, Joshua H Viers, Reza Ehsani, **"Data-Driven Model to Improve Mechanical Harvesters for Nut Trees"**, ASABE Annual International Meeting, 2024.

Samira Malek, Saber Salehkaleybar, Arash Amini, **"Multi Variable-layer Neural Networks for Decoding Linear Codes"**, Iran Workshop on Communication and Information Theory (IWCIT), IEEE, 2020.

Samira Malek, Saber Salehkaleybar, Arash Amini, **"A Deep Neural Network Architecture for Decoding Linear Codes Based on the Parity Check Matrix"** to be submitted (it's available here).

Teaching Experiences

- **TA for Discrete Mathematics** Pennsylvania State University. Spring&Fall 2023, Spring 2024
- **TA for Signal & System** Sharif Univesity of Technology. Fall 2019
- **TA for Stochastic Random Process & System** Sharif Univesity of Technology. Spring 2019
- **TA & MATLAB Teaching for Engineering Mathematics** Sharif Univesity of Technology. Spring 2019
- **Design Mock Test** of the Iran Nation-wide University Entrance Exam Known as Konkoor for B.Sc degree in Kanoon Institution, which has the most participants in Iran (more than +20,000 students every year). 2017–2018
- **Teaching Mathematics** Farzanegan High school (NODET), Preparing students for Iran National Mathematical Olympiad. 2014–2015

Selected Courses

Pennsylvania State University:

- Distributed Optimization (A)
- Large Scale Machine Learning(A)
- Pattern Recognition & Machine Learning(B+)
- Fundamentals of Computer Architecture
- Deep Learning for NLP (A-)
- Algorithm Design and Analysis (A)
- Secure & Robust Machine Learning (A)
- Machine Learning Algorithms & Tools

Sharif University of Technology:

- AI and Biological Computation (A+)
- Information hiding (A+)
- Probability and Statistics (A)
- Speech Processing (A+)

Selected Academic Projects

Generating Dataset with 5 LLMs and training BERT to classify the Generated datasets
in Python, as a project of Machine Learning course.
under supervision of Prof. Wenpeng Yin *Fall 2024*

Additive Backdoor attack and Detection on CIFAR-10 Classifier
in Python, as a project of Secure and Robust Machine Learning course.
under supervision of Prof. Kesidis *Spring 2024*

Training GPT by Prompting for multi-hop question answering task on HotPotQA
in Python, as a project of Deep Learning for NLP course.
under supervision of Prof. Rui Zhang *Spring 2023*

Implementation of Stochastic Gradient Descent Ascent & Compositional gradient for MinMax optimization
in Python, Under supervision of Dr. Mahdavi.
Spring 2023

Implementation of Viterbi algorithm & Reduced Complexity Viterbi Sequence Detector
in MATLAB, as a project of Advanced Communication System course.
under supervision of Prof. NasiriKenari *Spring 2020*

Implementation of a FeedForward and a Recurrent Neural Networks for Pitch Tracking in Noisy Speech
in Keras, Extraction pitch contours by SIFT, HPS, and AMDF algorithms in MATLAB as a project of Speech Processing.
under supervision of Prof. Ghaemmaghami *Spring 2019*

Design a Neural Network for Classification Right-handed and Left-handed Typing, with EEG Signal
in MATLAB, as a project of AI & Biological Computation course.
under supervision of Prof. Hajipour *Spring 2016*

Computer Skills

Languages: Python , MATLAB, SQL, C/C++, LaTeX, HTML
Softwares: Anaconda, Microsoft Power BI, Microsoft SQL Server Management

Languages

TOEFL Test: 95 (R:27, L:23, S:23, W:22) October 2023
GRE General Test: Overall Score 317 - Writing: 3.5 November 2021
Native: • Persian • Azerbaijani

Reference

References available upon request.